

FIVE NEW SPECIES OF *ACMAEODERA* (COLEOPTERA:
BUPRESTIDAE) FROM THE SOUTHWESTERN
UNITED STATES AND BAJA CALIFORNIA¹

By RICHARD L. WESTCOTT²

ABSTRACT: Five new species of the genus *Acmaeodera* are described: *A. reticuloides* (southern Baja California del Norte to San Diego County, California), *A. panamintensis* (mountains of southwestern Nevada and adjacent California), *A. atactopilota* (central Nevada and southwestern Utah to southern California), *A. verityi* (Colorado Desert, California), and *A. mojavei* (southern Arizona to southern California). Confusion of the last three species, both in collections and in the literature, with *A. pubiventris* Horn and *A. lanata* Horn is clarified. Considerable emphasis is placed on the use of the female genitalia as a taxonomic aid. Pertinent bionomical information is given.

INTRODUCTION

Extensive collecting and study in recent years by entomologists in the western United States has revealed many new species of this interesting and widespread genus of wood-boring beetle. The five species described herein belong to the group "Sinuatae," as defined by Horn (1878), which inhabits, for the most part, the desert and chaparral of southern California and adjacent regions. Two of the species have been recently discovered. The other species have been known but confused, both in collections and in the literature, with *Acmaeodera lanata* Horn and *A. pubiventris* Horn.

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In listing type material the author has found it convenient, in most instances, to use abbreviations for collector's names as follows:

R. P. Allen (RPA)	A. T. McClay (ATM)
W. F. Barr (WFB)	A. E. Michelbacher (AEM)
R. C. Bechtel (RCB)	D. R. Miller (DRM)
F. M. Beer (FMB)	G. H. Nelson (GHN)
R. M. Bohart (RMB)	K. T. Nelson (KTN)
M. A. Cazier (MAC)	F. W. Nunenmacher (FWN)
F. C. Clark (FCC)	F. D. Parker (FDP)
H. E. Cott (HEC)	W. M. Pearce (WMP)
H. K. Court (HKC)	R. L. Penrose (RLP)
J. H. Davidson (JHD)	W. Reeves (WR)
J. M. Davidson (JMD)	W. R. Richards (WRR)
D. W. Davis (DWD)	E. S. Ross (ESR)
A. Fenyes (AF)	E. I. Schlinger (EIS)
D. L. Flaherty (DLF)	W. E. Simonds (WES)
A. R. Gittins (ARG)	R. F. Smith (RFS)
T. R. Haig (TRH)	M. D. Snelling (MDS)
J. C. Hall (JCH)	L. A. Stange (LAS)
S. M. Hogue (SMH)	O. H. Sweezy (OHS)
M. E. Irwin (MEI)	V. M. Tanner (VMT)
A. E. Lewis (AEL)	J. W. Tilden (JWT)
E. G. Linsley (EGL)	P. C. Ting (PCT)
G. P. Mackenzie (GPM)	F. S. Truxal (FST)
C. D. MacNeill (CDM)	R. L. Usinger (RLU)
J. W. MacSwain (JWM)	E. P. Van Duzee (EPV)
W. R. M. Mason (WRM)	E. C. Van Dyke (ECV)
D. L. Mays (DLM)	D. S. Verity (DSV)
A. E. Meier (AM)	R. L. Westcott (RLW)
A. S. Menke (ASM)	B. E. White (BEW)

DISCUSSION OF TAXONOMIC CHARACTERS

In the species descriptions to follow, elytral markings when median or submedian are referred to as discal, and when lateral are termed submarginal, even though some may reach the margin. The markings are additionally referred to in accordance to their arrangement from anterior to posterior. Varying degrees of coalescence may be exhibited. A marking at the humeral

angle is always referred to as the humeral spot. Usually it is yellow, but it may be brownish. The humeral interval, located between the umbone and the lateral margin, is used in species descriptions, but due to its variability is not employed as a uniformly reliable diagnostic character.

The colored hairs on the pronotum and elytra range from very light coppery to fuscous and the lighter shades may be difficult to detect.

The genitalia have seldom been used in classifying *Acmaeodera*, but in most cases it is necessary to see them in order to differentiate the sexes. I have found that the female genitalia have several important characters of taxonomic value. Tanner (1927) made a study of the female genitalia of Coleoptera, and I have followed his terminology. The female genital apparatus of *Acmaeodera* is largely membranous. These membranous areas apparently are of little taxonomic value. The membranes bear setae (particularly apically) which might be significant, but are much too easily lost during mounting to be reliable. The characters of greatest importance are the form, size and arrangement (particularly the proportionate lengths) of the sclerotized structures. These structures consist of the proctiger, styli, and the baculi of the proctiger, valvifers, and coxites. The membranous portions of the coxites near the styli are flared. White (1939) incorrectly referred to the coxites as the subgenital plate. With additional study, characters which may prove of value are a length to width ratio of the distal portion of the ovipositor and the ratio of the distance between the styli to the length of a stylus.

The male genital apparatus is rather simple, of the modified trilobed type, and affords few characters of use in species separation. The only character of any value found in this study is the shape of the distal end of the penis, however the apex is sharply attenuate and in mounting may be easily broken behind the actual opening of the ejaculatory duct.

The five species described herein will key out, under "*Acmaeodera sinuatae*," either to couplet 10 or 11 according to Fall (1899). Difficulty arises in the interpretation of density of vestiture of the ventral surface and this cannot now, in my opinion, be adequately used as presented by Fall. Any attempt to define the species described herein on this basis would be of little value without a complete revision of the group "*Sinuatae*."

In the discussion to follow the species will be related to Fall's key as a matter of formality, since it is the only key to the North American *Acmaeodera*. However, in my opinion, this is of very limited value due to the large number of species described since and the many species yet to be named.

Acmaeodera recticolloides, new species

Figures 1, 10

FEMALE: Medium-sized, moderately robust. Head and pronotum black with slight bronzy luster. Elytra black, shining, with a discal row of five and a marginal-submarginal row of six to seven light yellow spots, apical two-fifths with reddish markings laterally, first discal spot immediately behind front

margin, median spots coalesced into a fascia which does not reach as far mesad as other discal spots, humeral spot present.

Head densely clothed with long, erect, silky white hairs, interspersed with dark hairs dorsally, coarsely, densely punctate, reticulate.

Pronotum slightly narrower than elytra, 1.87 times as wide as long, widest at base; surface with a feeble, median, basal depression and a slight depression in front of lateral pit, densely clothed with long, erect, silky white hairs on basal half and sides, and with dark coppery brown hairs on apical half, disc coarsely, densely punctate, punctures becoming coarser and denser towards sides; lateral margins arcuate, entire, more arcuate on apical half which is flanged and visible from above.

Elytra widest just behind umbone; sides subparallel for basal three-fifths then gradually rounded to apex; lateral margins serrate on apical two-fifths; surface moderately clothed with long, erect, fuscous hairs which are interspersed with long, silky white hairs, basal three-fifths with recumbent to subrecumbent silky white hairs at sides; stria punctures medium to coarse, becoming confused at base, discal striae paired, at least on basal three-fifths, outer striae with coarser punctures, interstria punctures medium, shallow; humeral interval moderately developed, not elevated in front.

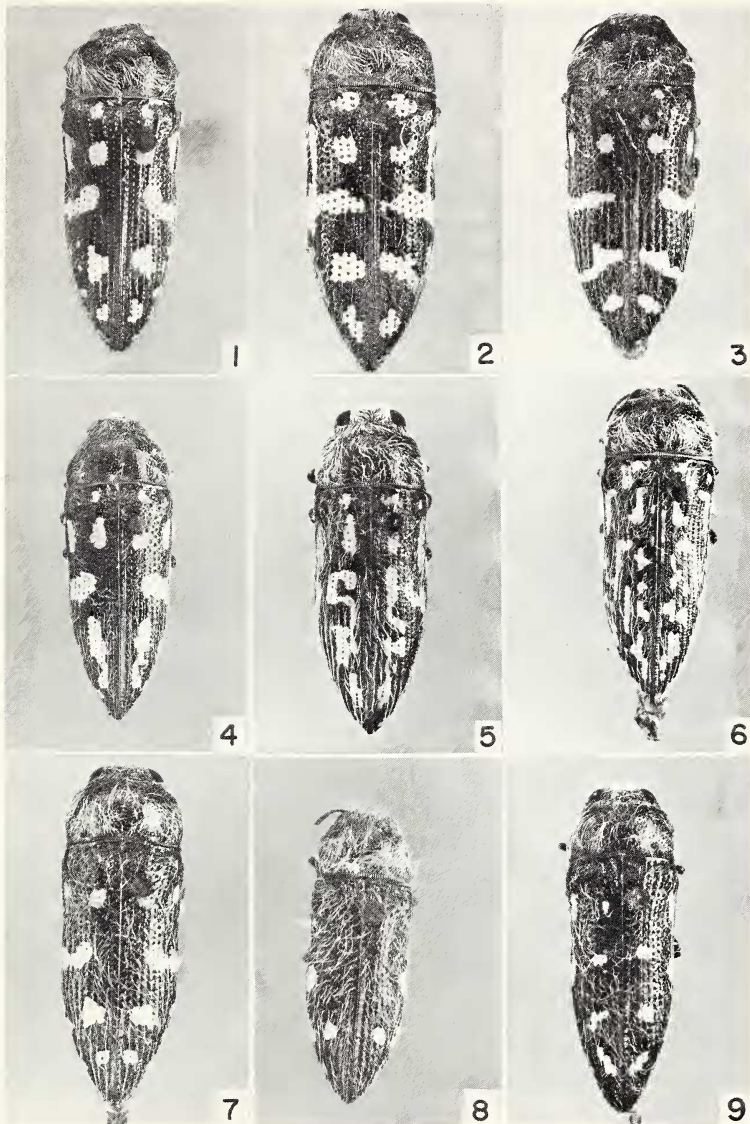
Ventral surface with prosternal margin trisinate, with a moderately developed rounded prominence on either side of middle; abdomen moderately clothed with long, subrecumbent to suberect, silky white hairs at middle becoming dense at sides, punctures medium-sized and moderately placed at middle becoming denser and slightly larger laterally, punctures of first visible sternite much coarser anterolaterally, second visible sternite distinctly more densely punctate at middle than first, last visible sternite with a well-developed, rounded, subapical plate. Female genitalia as in Fig. 10.

Length: 9.1 mm. Width: 3.3 mm.

TYPE MATERIAL AND LOCATION: Holotype female, La Zapopita, Valle de Trinidad, Baja California del Norte, Mexico, April 16, 1962 (G. H. and K. T. Nelson), collected on *Ephedra californica*, deposited in the California Academy of Sciences. One hundred seventy paratypes, same locality as holotype, April 16–18, 1962 (GHN, KTN, DSV, RLW); 4 mi W La Zapopita, April 16, 1961 (FST). Seven, 5 mi SE and 15 mi NW Desengano, Baja California, Mexico, June 6, 1966 (DSV). One, 4 mi W Jacumba, San Diego Co., California, June 5, 1957 (DSV). Four, Boulevard, San Diego Co., California, June 1, 1968 (DSV). Paratypes in the collections of the Los Angeles County Museum of Natural History, United States National Museum, J. M. Davidson, G. H. Nelson, D. S. Verity, W. F. Barr, and the author.

DISTRIBUTION: Southern Baja California del Norte, Mexico to extreme southern California.

BIONOMICS: This species was taken at the type locality and at Boulevard, San Diego Co., California, resting on or flying over *Ephedra californica*



FIGURES 1-9. Dorsal view of adult *Acmaeodera* selected to show general form and elytral maculation. FIG. 1, *recticollis*, new species, type locality. FIG. 2, *recticollis* Fall, 2 mi S Holbrook, Ariz. FIG. 3, *panamintensis*, new species, type locality. FIG. 4, *pubiventris* Horn, Independence, Calif. FIG. 5, *lanata* Horn, Wildrose Can., Panamint Mts., Calif. FIG. 6, *atactospilota*, new species, Lone Pine Campground, Calif. FIG. 7, *verityi*, new species, 5 mi NW Palm Springs, Calif. FIG. 8, *verityi*, Snow Creek, Calif. FIG. 9, *mojavei*, new species, 6-9 mi NE Red Mt., Calif.

Watson. The habits of related *Ephedra*-inhabiting species, plus the fact that *A. recticolloides* was taken on no other plant in the area, indicate that *E. californica* is its host. Several specimens were collected on *Lotus scoparius* (Nuttall in Torrey and Gray) Otley near Desengano, Baja California del Norte.

In northern Baja California del Norte this beetle inhabits an area reminiscent of the moister Sonoran Desert element of Arizona, yet representing the beginning of a transition toward chaparral. Several species of *Acmaeodera* commonly associated with chaparral have been taken in this area. There is an abundance of mesquite and the vegetation is quite dense in places. In contrast, the related *A. recticollis* Fall inhabits a wide range far to the east of *A. recticolloides* from the sparsely vegetated plateau regions of northeastern Arizona to the desert regions of Big Bend National Park, Texas. It, too, is associated with *Ephedra*.

VARIATION: This species exhibits slight variation. It ranges from 7.7 to 10.7 mm in length and from 2.7 to 4.0 mm in width. The basal discal spot of each elytron was found in all but two specimens. However, it varies in size and is on rare occasion coalesced with the spot behind it. The median discal spots of each side are almost always coalesced into a fascia. The reddish apical spots of each elytron are narrow, usually three in number, and may be variously coalesced with each other or with adjacent yellow spots. Occasionally the color is a faint pinkish which is difficult to detect if only one or two spots are present. It is of interest that this species can, in most cases, be sexed by examining the form of the subapical plate. In the male it is usually broadly rounded or truncate behind. The female has the plate more narrowly rounded, usually giving it a triangular appearance.

DIAGNOSIS AND COMPARISON: *Acmaeodera recticolloides* will key into the couplet containing *A. lanata* and *A. pubiventris* or to *A. recticollis* in Fall (1899). The presence of dark hairs on the elytral surface and reddish markings on the elytral apices will readily separate *A. recticolloides* from *A. lanata* and *A. pubiventris*. It appears most closely related to *A. recticollis* and may be readily distinguished from that species by its blacker ground color and abundant dark hairs on the elytra. *Acmaeodera recticolloides* averages smaller in size and is less robust. The lateral reddish markings are smaller and less pronounced. The second visible abdominal sternite of *A. recticolloides* is distinctly more densely punctate at the middle than the first and the punctures appear equal in size, while in *A. recticollis* the difference in density is much less pronounced and the punctures of the second visible sternite are finer. *Acmaeodera recticolloides* might be confused with some of the chaparral-inhabiting species of California, but the form and color of its markings, coupled with the much denser vestiture beneath should serve to readily separate it.

This species is named for its superficial resemblance to *A. recticollis*.

Acmaeodera atactospilota, new species

Figures 6, 13

FEMALE: Medium-sized, moderately robust. Head and pronotum black, with coppery reflections near front margin and laterally on pronotum. Each elytron black with purplish reflections, markings yellowish, those of disc vermiculate and approximating or meeting a submarginal, longitudinal, broken row of small spots which extends nearly to apex, humeral spot present.

Head densely clothed with moderately long, semirecumbent, silky white hairs, coarsely, densely punctate, reticulate, and with a very well-developed, median, dorsal carina.

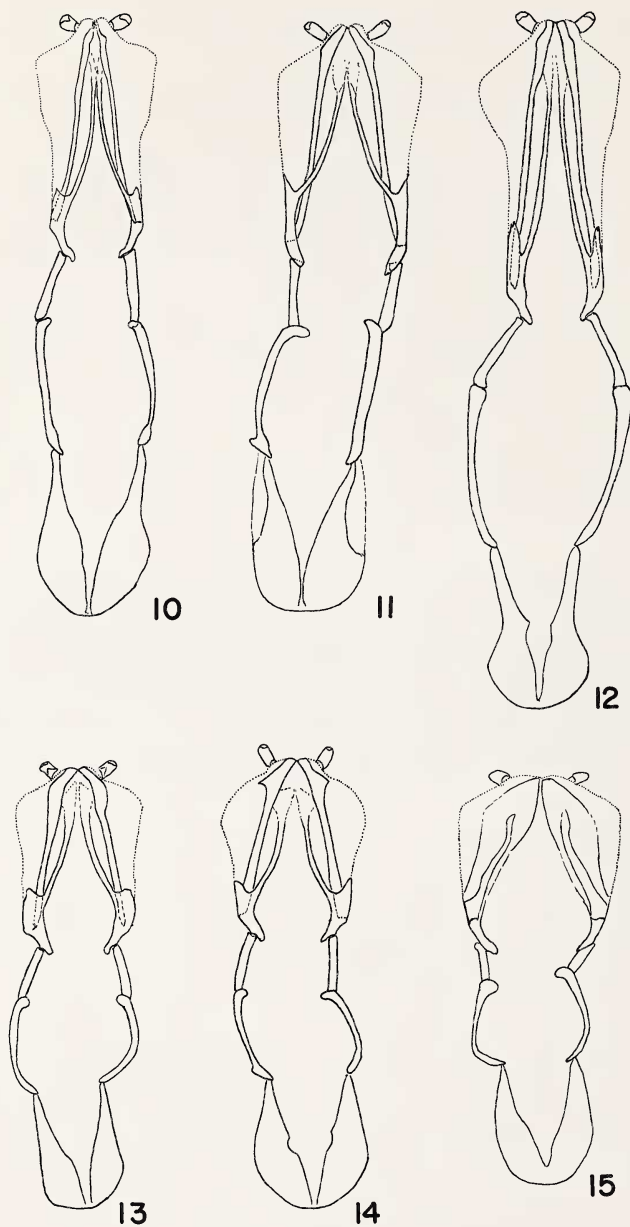
Pronotum as wide as elytra, 1.79 times as wide as long, widest behind middle, wider at base than apex; surface with a shallow median depression in front of base and a slight depression in front of basal pits, basal two-thirds of disc, sides, and extreme front densely clothed with long, subrecumbent, silky white hair, apical third of disc with long, erect, coppery brown hairs, disc coarsely, densely punctate, punctures becoming much coarser and denser towards sides; lateral margins arcuate, entire, prominent apically, not visible from above.

Elytra widest at base; sides subparallel for basal two-thirds, then moderately converging to apex; lateral margins serrate on apical two-fifths; surface moderately clothed with long, erect to recumbent, silky white hair, inner discal striae more widely separated than outer striae and with punctures small to large, punctures of outer discal striae coarser, deeper, and denser, interstrial punctures shallow, small to medium-sized; humeral interval feebly developed, not elevated to level of front margin.

Ventral surface with prosternal margin trisinate, with a shallowly rounded prominence on either side of middle; abdomen moderately clothed with long, recumbent or subrecumbent, silky white hair at middle of first visible sternite, becoming dense elsewhere, most dense at sides, punctures moderately placed at middle of first visible sternite, becoming coarser and denser toward sides, second visible sternite more finely, distinctly more densely punctate at middle than first, last visible sternite with a large, well-developed, widely rounded, subapical plate. Female genitalia as in Fig. 13.

Length: 9.3 mm. Width: 3.2 mm.

TYPE MATERIAL AND LOCATION: Holotype female, near Littlerock, Los Angeles County, California, May 10, 1959 (R. L. Westcott), deposited in the California Academy of Sciences. Two hundred fifty-nine paratypes from the following localities: NEVADA: Nye County: near Berlin, VI-27-1960 (RLW); Ichthyosaur State Park, VI-21-24-1960 (RLW); Beatty, V-31-1962 (FDP, LAS). Esmeralda County: Goldfield, VI-26-1907 (FWN), III-20-1961 (FMB), dug from *Ephedra*. Clark County: Jean, V-28-1950 (CDM); Lee Canyon, Charleston Mtn., V-24-1940 (WR, MAC, PCT), VI-27-1966 (WFB, RLP), VII-1-1966 (RLW), VI-17-18-1967 (WFB, RLP, SMH); Kyle Canyon, VI-27-1947 (ATM), V-8-1964 (RLW), reared from



FIGURES 10-15. Female genitalia of *Acmaeodera*: FIG. 10, *recticolloides*; FIG. 11, *panamintensis*; FIG. 12, *lanata*; FIG. 13, *atactospilota*; FIG. 14, *verityi*; FIG. 15, *mojavei*.

Ephedra viridis. CALIFORNIA: Inyo County: Bishop, VI-21-1929 (EPV), VI-28-29-1950 (JWT); Big Pine, VI-17-1929 (RLU); 5 mi NE Big Pine, V-29, VI-1-1960 (DSV, RLW); 7 mi E Big Pine, VII-2-1960 (WFB); Independence, VI-11-1929 (RLU), V-25-1959 (GHN), V-29, VI-1-1960 (DSV, RLW); Lone Pine, V-19-27-1937 (ECV); 3 mi W Lone Pine, V-29-1960 (RLW); Lone Pine Campground, 6 mi W Lone Pine, V-28-1960 (DSV, RLW); Lone Pine Creek, VI-7-1939 (RMB); Olancha, VI-15-1941 (GPM); Westgard Pass Plateau, V-26-1937 (AM); Batchelder Spring, VI-16-1960 (HKC); 8 mi W Deep Springs, VII-3-1965 (FMB); Panamint Mts., S of Emigrant Jct., 4500-5000', V-24-1959 (GHN); 16 mi N Trona, V-30-1960 (DSV). Kern County: Randsburg, V-25-1958 (DSV, RLW). San Bernardino County: 1 mi S Adelanto, VI-1-1962 (MEI); 2 mi SW Phelan, VII-13-1963 (DSV); Desert Springs, VIII-3-1958 (GHN), VI-11-1962 (GHN); 4 mi SE Desert Springs, VII-12-1959 (RLW); Yermo, IV-28-1949 (EGL, JWM, RFS); 25 mi E Baker, VI-24-1948 (ECV); Windmill Station, V-28-1950 (CDM, HEC); Bonanza Mine, Providence Mts., 1939 (EPV). Los Angeles County: Palmdale, V-26-1957 (DSV); Littlerock, VI-8-1941 (GPM), V-28-1955 (WES), V-26-1957 (DSV), V-30-1957 (WES), V-10-1959 (DSV, RLW); 3 mi SE Pearlblossom (DSV). Paratypes deposited in the collections of the American Museum of Natural History, California Academy of Sciences, California Department of Agriculture, Los Angeles County Museum of Natural History, United States National Museum, University of California at Davis and Riverside, W. F. Barr, F. M. Beer, J. M. Davidson, G. H. Nelson, R. L. Penrose, J. W. Tilden, D. S. Verity, and the author.

Forty-seven specimens from the following localities are not included as paratypes: NEVADA: Washoe County: Nixon, VI-24-1964 (FDP). White Pine County: Ely, VI-15-1941 (GPM). Lincoln County: Pioche, VII-9-1965 (WFB, RLW), VI-25-1966 (RLW). UTAH: Washington County: Zion Canyon, VI-19-1933 (OHS). ARIZONA: Mohave County: Wolfhole, VI-3-1941 (VMT). Yuma County: 18 mi SE Parker, V-14-1966 (MAC, JMD). CALIFORNIA: Mono County: Topaz Lake, VI-26-1957 (DLF). San Bernardino County: Morongo Valley, V-26-1941 (ECV), V-19-1951 (RCB), VII-6-1959 (DSV), V-21-1961 (GHN); Joshua Tree, VI-24-1955 (RPA). Riverside County: Banning, V-20-1941 (ECV); 3 mi N US 99 on road to Morongo Valley, VI-22-1957 (RLW); 5 mi W Desert Hot Springs, VI-22-1957 (DSV); North Palm Springs, VI-21, 23-1959 (GHN), VI-5-1960 (DSV); Snow Creek, VI-1-1957 (DLM, RLW), VI-23-1957 (DSV); Palm Springs, VII-1-1941 (BEW); 2 mi W Mecca, VI-10-1963 (DRM). San Diego County: 2 mi E Jacumba, VI-23-1960 (GHN).

DISTRIBUTION: Central Nevada to southwestern Utah, northwestern Arizona and southern California.

BIONOMICS: Two adults of *A. atactospilota* were reared from *Ephedra viridis* Coville collected in Kyle Canyon, Clark County, Nevada. This plant

does not occur in many of the localities where *A. atactospilota* is taken, therefore the beetle probably utilizes additional species of *Ephedra* as hosts. Adults have been taken visiting flowers of the following plants: *Sphaeralcea rusbyi eremicola* (Jepson) Kearn, *Viguiera reticulata* Watson, *Encelia farinosa* Gray, *Coreopsis bigelovii* (Gray) Hall, *Stephanomeria pauciflora* (Torrey) A. Nelson, *Salvia dorii* (Kellogg) Abrams, *Eriogonum inflatum* Torrey & Fremont, *E. fasciculatum* ssp., *Acacia greggii* Gray, and *Fallugia paradoxa* (D. Don) Endlicher.

This beetle has the widest ecological and geographic range of any species described herein. It seems to be most abundant in the higher desert regions, as few specimens have been taken below 1500 feet above sea level, and has been collected at nearly 7000 feet in semi-arid desert mountain ranges.

VARIATION: Specimens of *A. atactospilota* available for study ranged from 6.5 to 10.7 mm in length and from 2.2 to 3.8 mm in width. This species exhibits great variation in elytral maculation. The spots are almost always scattered in a vermiculate pattern, although some specimens may have the spots arranged in a regular pattern, thus causing confusion with *A. lanata*. Ninety-eight per cent of the specimens studied have a basal, discal spot which is often elongate and oblique. The other spots may be variably coalesced. Rarely, a condition exists where all the median spots are connected across one or both elytra. In either case the resultant marking does not extend across the suture and often it resembles a reversed or inverted "C". Ninety per cent of all specimens studied were found to have a humeral spot, although it was found only on one side in some instances. A specimen from Ichthyosaur State Park, Nevada, has a yellow spot on one side of the pronotum. Light or dark coppery hair was found to occur on the pronotum in 94 per cent of the specimens studied. In addition, the head usually bears this colored hair. Sometimes the coloration may be faint and only a few such hairs may be present, even on the pronotum. The humeral interval was almost always found to be poorly developed. Most specimens have a well-developed subapical plate.

Specimens from the Colorado Desert region are, in general, more strongly marked and exhibit a greater degree of spot coalescence. In addition, the vestiture is more dense, particularly on the venter. Specimens from central Nevada average larger in size and are less densely clothed with hairs. They present a slightly different facies.

DIAGNOSIS AND COMPARISON: *Acmaeodera atactospilota* is most apt to be confused with some forms of the sympatric *A. lanata* (Fig. 5) and will key out to such in Fall (1899). In his discussion of the latter, Fall refers to "confusedly maculate" forms. Van Dyke (1919) refers to a phase of *A. pubiventris* having the markings numerous, small, and irregular. It seems likely that both authors had specimens of *A. atactospilota* before them. Kerremans (1906) figured a specimen which he labeled *A. lanata*, but which proves to be *A. atactospilota*. This species can usually be separated from

A. lanata by its confused maculation. Specimens of the latter with the vittae broken into spots rarely have additional spots between vittae, although those of the discal row are often displaced laterally. In most all cases the presence of coppery hair on the pronotum, coupled with the submarginal row of broken spots on the elytra of *A. atactospilota*, will serve to separate the two species. Any doubt remaining would be quickly dispelled upon comparison of the overall shape and length of the female genitalia (Figs. 12, 13). Although *A. atactospilota* shows close affinity with *A. lanata*, the presence of coppery hair and the structure of the ovipositor give evidence of a closer relationship to *A. verityi*. The two, however, are readily separated by differences in elytral maculation. A few specimens of *A. atactospilota* examined from the Panamint Range, California, possess dark hairs near the apices of the elytra, which is characteristic of *A. mojavei*, but only one specimen was seen which had elytral markings similar to that species. *Acmaeodera atactospilota* can be readily separated from *A. mojavei* by the denser vestiture of the former.

The name for this species was derived from the Greek "ataktos," meaning not arranged or irregular, and the Greek "spilotos," meaning spotted.

Acmaeodera verityi, new species

Figures 7, 8, 14

FEMALE: Medium-sized, robust. Head and pronotum black with slightly metallic reflections. Each elytron black, shining, with occasional slight purplish or bluish reflections, with a discal and submarginal row of four paired yellow spots beginning at basal fourth and extending to apical fifth, the basal discal spot farthest from its submarginal counterpart, the median discal spot displaced laterally and closely approximating its submarginal counterpart, humeral spot absent.

Head densely clothed with long, erect to suberect, silky white hair, a few dark hairs present on upper fourth punctures coarse, densely placed.

Pronotum slightly narrower than elytra, 1.65 times as wide as long, widest on basal half; surface with slight trace of median depression in front of base, densely clothed with long, erect to subrecumbent, silky white hair except for an apical portion of disc which possesses mostly coppery brown hair, punctures dense, medium-coarse at middle of disc, becoming denser and much coarser toward sides; lateral margins arcuate, entire, much more prominent anteriorly, not visible from above.

Elytra widest just behind base; sides subparallel for basal three-fifths then moderately converging to apex; lateral margins serrate on apical two-fifths; surface moderately clothed with long, erect to recumbent, silky white hair, a few dark hairs along sides on apical fourth, outer discal striae closer together and with coarser, deeper punctures than inner striae, punctures elongate at base, interstitial punctures medium-sized, shallow, confused basally; humeral interval moderately developed, coarsely punctured, not attaining level of front margin.

Ventral surface with prosternal margin trisinate, with a moderately developed, rounded prominence on either side of middle; abdomen sparsely clothed with long, suberect to recumbent, silky white hair at middle of first visible sternite, becoming densely clothed at sides; punctures medium-sized, becoming coarser and denser toward sides, much coarser anterolaterally on first visible sternite, second visible sternite distinctly more densely punctate at middle than first, last visible sternite with a small, acute subapical plate. Female genitalia as in Fig. 14.

Length: 8.8 mm. Width: 3.1 mm.

TYPE MATERIAL AND LOCATION: Holotype female, 5 miles northwest of Palm Springs, Riverside County, California, May 10, 1958 (G. H. Nelson), deposited in the California Academy of Sciences. Two hundred forty-three paratypes from the following localities in California: San Bernardino County: Morongo Valley, V-26-1941 (ECV), V-4, VI-22-1957 (RLW), V-18-1958 (GHN), V-3-1959, VI-5-1960 (DSV). Riverside County: Whitewater, IV-17-1937 (AEM), VI-28-1937 (ATM), IV-20-1951 (RCB); 5 mi W Desert Hot Springs, VI-22-1957 (DSV); 5 mi E Cabazon, IV-2-1961 (DSV); Snow Creek, IV-27 & 28, V-4 & 5, VI-1-1957 (DLM, DSV, RLW), V-1-1960 (RLW); Palm Springs Station, VI-27-1952 (ATM); 6 mi NW Palm Springs, IV-15-1961 (DSV); 5 mi NW Palm Springs, VI-18-1954, V-4-14, VI-22-1958, IV-23-1959, VI-12-1960 (GHN), VI-22 & 23-1957, V-10 & 11, VII-6-1958, IV-9-1961 (DSV, RLW); Palm Springs, "April" (AF), III-1929 (FCC), VII-1-1941 (BEW); Mission Creek, V-1-1952. Imperial County: Chocolate Mts., IV-9-1939 (RPA). Paratypes in the collections of the American Museum of Natural History, California Academy of Sciences, Los Angeles County Museum of Natural History, Nevada State Department of Agriculture, United States National Museum, University of California at Davis, W. F. Barr, J. M. Davidson, D. L. Mays, G. H. Nelson, F. H. Parker, D. S. Verity, and the author.

Specimens from the following localities in California are not included as paratypes: Inyo County: 13 mi S Death Valley Jct., V-20-1965 (ASM); Death Valley, IV-27-1950 (DWD). Ventura County: 5 mi N Simi, V-4-1959 (DLM). Riverside County: 3.3 mi E Nightingale, V-1-1960 (RLW); Hwy. 74, Santa Rosa Mts., 3500', V-14-1958 (GHN); slope below Pinyon Flat, 2000', IV-10-1949 (ESR); Deep Canyon, V-3-1963 (EIS). San Diego County: 4 mi E Jacumba, VI-7-1959, V-20-1961 (DSV).

DISTRIBUTION: California: Colorado Desert and outlying areas.

BIONOMICS: Adults are most commonly taken resting on stems of *Ephedra californica*, which most likely is the larval host plant. They have also been taken on *Dalea californica* Watson where these species grow in close association. One specimen was taken on a flower of *Viguiera deltoidea* Gray. They have been taken on other yellow-flowered Compositae.

Acmaeodera verityi has been found primarily in the upper Colorado Desert area from Morongo Valley to Palm Springs, California. Four speci-

mens labeled "five miles north of Simi, Ventura County, California" present an ecological and distributional problem. This locality is in a Coastal Sage Scrub-Chaparral zone miles away from any desert region and well over 100 miles from any other known locality where *A. verityi* occurs. Also collected at this site were two specimens of *A. lanata*. *Ephedra*, which is a known host of the latter and a possible host of the former, was sought at this locality but to no avail. The significance of this entire situation can only await further collecting and study. The possibility of mislabeling exists. Two specimens from four miles east of Jacumba, San Diego County show a somewhat different facies than Colorado Desert material, and their status remains in doubt. A female specimen from south of Death Valley Junction exhibits the general facies of *A. mojavei*, but examination of the genitalia showed it to be conspecific with *A. verityi*. Another specimen, a male, from Death Valley is assigned tentatively to this species. These localities are far removed from the known range of this beetle and further collecting is needed to correctly interpret its range and variation.

VARIATION: Specimens of *A. verityi* examined ranged from 6.3 to 10.0 mm in length and from 2.1 to 3.8 mm in width. This species exhibits extensive variation in elytral maculation. In the series examined many specimens exhibit more or less than the number of spots present on the holotype. Very rarely a discal spot at the base and/or a humeral spot occurs. The discal spot at the basal fourth is variable in size but always roundish in shape. It is the one most commonly absent, occurring in only 63 per cent of the specimens studied. More rarely the median discal spot is absent and when this is the case (common in specimens from Morongo Valley) the preceding condition occurs concomitantly. The median discal and submarginal spots of each elytron were found to be coalesced in 70 per cent of the specimens studied. Sometimes the discal markings are present only in the form of one or two spots near the apex of each elytron (Fig. 8). The extreme in reduced maculation was seen on one specimen which had a total of three spots on one elytron and two on the other. Five specimens were seen with pronotal spots either on one or both sides. The occurrence of dark hair on the dorsal surface varies. This is almost always present on the pronotum and in most cases can be found near the elytral apices where it is often inconspicuous. Occasionally this hair is present on the basal portions of the elytra.

DIAGNOSIS AND COMPARISON: *Acmaeodera verityi* has been placed under *A. pubiventris* (Fig. 4) in most collections, and will key out next to this species in Fall (1899). The elytral markings and ground color and their completely allopatric distribution readily separates the two species. Difficulty may arise, however, in separating this species from *A. mojavei*. In general appearance *A. verityi* is more robust and the markings are less numerous. *Acmaeodera mojavei* usually has the pronotum distinctly narrower than the elytra, while in *A. verityi* this character is not usually so distinct. *Acmaeodera*

verityi is more densely pubescent on the venter, and the dark hairs near the apices of the elytra are usually less discernible. These hairs are rarely as abundant as in *A. mojavei*. The front margin of the prosternum is always trisinate in the former and often emarginate in the latter. In *A. mojavei* the second visible sternite usually is much less densely punctate at the middle in relation to the middle of the first visible sternite. The subapical plate of *A. mojavei* is less prominent. The two species are readily separated on the basis of the structure of the female genitalia, which in *A. verityi* have the styli placed closer together. In addition there is a marked difference in sclerotization of the apical portions of the dorsal baculi, it being much broader and lighter in *A. mojavei*.

I take great pleasure in naming this species after Mr. D. S. Verity, who has collected a large number of the specimens used in this study and who has contributed greatly to my interest in this genus.

Acmaeodera mojavei, new species

Figures 9, 15

FEMALE: Medium-sized, moderately elongate. Head black with coppery luster. Pronotum bluish black with coppery reflections along extreme front and at sides. Each elytron black, shining, with yellow spots as follows: A discal row of five, beginning at base and extending to apical fifth, the median and fourth spot located slightly laterad to the others, and a submarginal row of four paired with those of disc and beginning just behind umbone (apical spot missing on right side), humeral spot absent.

Head densely clothed with long, erect to suberect, silky white hair which is interspersed with dark hair on upper portion, coarsely, densely punctate, reticulate.

Pronotum narrower than elytra, 1.82 times as wide as long, widest behind middle, wider at base than at apex; surface with a slight depression at middle in front of base and in front of basal pits, disc moderately densely clothed with long, erect to subrecumbent, silky white hair on basal three-fourths, apical fourth with coppery brown hairs, front margin and sides clothed with shorter silky white hair, punctures coarse and dense on disc, becoming deeper towards sides; lateral margins arcuate, entire, flanged, very prominent, not visible from above.

Elytra widest behind base; sides subparallel for basal two-thirds then moderately converging to apex; lateral margins serrate on apical two-fifths; surface moderately clothed with long, mostly erect, silky white hair infused with dark hair on apical fourth, striae punctures medium to coarse, coarser, deeper, and denser toward sides, interstriae punctures medium, shallow; humeral interval feebly developed, heavily punctured.

Ventral surface with prosternal margin shallowly, arcuately emarginate; abdomen moderately clothed (more densely at sides) with semierect to recumbent, silky white hair, punctures small, moderately spaced, becoming

coarser and dense towards sides of first visible sternite, second visible sternite slightly more densely punctate at middle than first, last visible sternite with a feebly developed, obtusely rounded, subapical plate. Female genitalia as in Fig. 15.

Length: 8.2 mm. Width: 2.8 mm.

TYPE MATERIAL AND LOCATION: Holotype female, Panamint Mountains south of Emigrant Junction, Inyo County, California, elevation 4500-5000 feet, May 24, 1959 (G. H. Nelson), deposited in the California Academy of Sciences. One hundred twenty-nine paratypes from the following localities in California: Inyo County: same locality as holotype, V-11, V-24-1959 (GHN). Kern County: Mojave, V-1-1905 (AF), VI-1917 (ECV); 33 mi N Mojave, VI-10-1962 (GHN); Searles Sta., IV-28-1950 (DWD); Boron, V-10-1955 (WRM). San Bernardino County: 6-9 mi. NE Red Mtn., V-11-1959 (GHN), 7, 11 and 17 mi N Red Mtn., V-24-1970 (RLW); 5 mi SW Victorville, V-10-1959 (GHN); Barstow, V-23-1947 (GPM); Mitchell's Cavern, VI-16-1962 (DSV); Helendale, V-18-1955 (WRR); Apple Valley, V-6-1955 (WRM); Saddleback Butte, IV-20-1959 (JCH); 5 mi S Twenty-nine Palms, VI-5-1960 (DSV). Los Angeles County: Palmdale, V-26-1957 (DSV); Littlerock, V-30-1957 (WES), V-10-1959 (DSV); Lancaster, V-2-1905 (AF); Valyermo, IV-21-1940 (RMB). Paratypes in the collections of the American Museum of Natural History, California Academy of Sciences, California Department of Agriculture, Canada Department of Agriculture, Los Angeles County Museum of Natural History, United States National Museum, University of California at Davis and Riverside, G. H. Nelson, D. S. Verity, W. F. Barr and the author.

Thirty-six specimens from the following localities are not included as paratypes: UTAH: "Utah" (MAC). NEVADA: Esmeralda County: 15 mi S Goldfield, VI-2-1961 (DSV). ARIZONA: Mohave County: Wickieup, IV-17-1962 (GEB). Pinal County: 3-13 mi N Florence, IV-17-1964 (WFB), IV-13 and 16-1966 (WFB, MAC, JMD, JHD); Florence Jct., IV-5-1954 (TRH).

CALIFORNIA: Inyo County: Lone Pine, V-2, V-24-1937 (ECV); Lone Pine Campground, V-28-1960 (DSV). Riverside County: Desert Center, IV-14-1964 (AEL). San Diego County: San Felipe Valley, V-5-1962 (DSV).

DISTRIBUTION: Southwestern Utah and southern Nevada to southern Arizona and California.

BIONOMICS: The majority of specimens were taken near Red Mtn., San Bernardino Co., California, visiting the flowers of *Cassia armata* Watson on which I observed them feeding. This beetle also has been taken visiting the flowers of *Encelia farinosa*, *Sphaeralcea rusbyi eremicola*, and *C. covesii* Gray. It is the only species discussed herein that has not been associated with *Ephedra*.

VARIATION: Specimens of *A. mojavei* available for study from California ranged in length from 6.4 to 11.5 mm and in width from 2.3 to 4.0 mm. This

species exhibits wide variation in the form of the prosternal margin, which ranges from emarginate to strongly trisinate. Only 25 per cent of the specimens studied were found to have this margin trisinate and most of them only feebly so. Almost all specimens exhibiting a strongly trisinate prosternal margin were of larger size. The arrangement of elytral spots is fairly consistent, but variation in their size and number is evident. A basal discal spot, occasionally on one side only, is present in 91 per cent of the specimens studied and 35 per cent of the specimens have the median spots in each row coalesced to form an oblique fascia on each elytron. One specimen was seen with the elytral maculation coalesced and reduced to a short vitta on the apical portion of each elytron, with a tiny, median, lateral spot on one elytron. This condition has also been observed in *A. lanata*. The humeral spot was found to be present in 5 per cent of the specimens. Occasionally a specimen will have one or two pronotal spots. One specimen has two spots on one side and one on the other. The great majority of specimens have dark hairs on the head and pronotum, and all possess them on the apical portions of the elytra. The subapical plate is usually poorly developed and rarely does it give the effect of a double margin. Specimens from Lone Pine, California, have the plate most strongly developed.

A series of 25 specimens from southern Arizona differs slightly from the California forms. The elytral spots are generally smaller and there seems to be much less of a tendency for the median spots to coalesce. Only one specimen was found to possess a humeral spot. None of these specimens exhibits a strongly trisinate prosternal margin. Although the California and Arizona forms appear somewhat different to the eye, subspecific separation seems unwarranted at this time.

DIAGNOSIS AND COMPARISON: The affinities of *A. mojavei* are difficult to ascertain. In Fall's (1899) key it may run to *A. lanata* (Fig. 5) and *A. pubiventris* (Fig. 4), but a comparison of elytral maculation will serve to readily separate it from those species. It may also key to *A. fenyesei*, the elytral markings of which are mere specks, or *A. recticollis*, which differs at once in having apical, red elytral markings. Van Dyke (1919) confused specimens, which proved to be this species, from Mojave, California, with *A. pubiventris* (Fig. 4). One would tend to place specimens with an emarginate prosternum in the group "Emarginatae," as defined by Horn (1878), but the female genitalia are definitely not of the type found in that group. The structure of the female genitalia is, in fact, quite unlike that of the other species discussed herein and may suggest that *A. mojavei* should stand by itself. Based on this study *A. mojavei* appears most closely related to *A. verityi* with which it is most apt to be confused. Some specimens may also resemble *A. panamintensis*. Differences are discussed in the sections dealing with those species.

Two specimens from San Felipe Valley, California, present an enigma. They are far removed from any known locality of *A. mojavei*, however they

agree well with that species in general appearance and the female genitalia corroborate this. Perhaps this gives evidence that *A. mojavei* was once widespread over southern California, but could not adapt to the hotter, drier conditions of the lower desert regions.

Acmaeodera panamintensis, new species

Figures 3, 11

FEMALE: Large, moderately robust. Head and pronotum black with feeble coppery reflections. Each elytron black, shining, with orangish yellow markings as follows: a median discal spot at base, paired discal and submarginal spots at basal fourth, a median fascia reaching second discal stria, paired discal and submarginal spots near apical third, a transverse spot midway to another pair near apical fifth, right elytron with an additional small spot near apex, humeral spot absent.

Head densely clothed with silky white hair on apical half, with long fuscous hair on basal half, coarsely, reticulately punctured.

Pronotum as wide as elytra, 1.87 times as wide as long, wider on basal half, widest in front of base; surface with a broad, shallow, median basal depression, and with a shallow, oblique impression in front of lateral pits, densely clothed with long, suberect, fuscous hair on apical two-fifths, except on extreme front and sides which are clothed with silky white hair, basal three-fifths with silky white hair interspersed with a few fuscous hairs, disc coarsely, densely punctured, punctures becoming coarser and denser toward sides; lateral margins arcuate, entire, flanged on apical two-thirds, part of flange visible from above.

Elytra widest on basal ninth; sides sinuate behind umbone, gradually rounded from middle to apex; lateral margins serrate on apical half; surface moderately clothed with long, erect to suberect, fuscous hair interspersed with silky white hair, except on basal two-thirds at sides where there are long, recumbent to subrecumbent, silky white hairs, inner striae separated by about one and one-half to two times the width of punctures, outer striae much closer, with punctures coarser and deeper, interstrial punctures medium-sized, shallow; humeral interval well developed, elevated basally, heavily punctured posteriorly.

Ventral surface with prosternal margin trisinate, with a well developed, rounded prominence on either side of middle; abdomen sparsely to moderately clothed at middle with long, recumbent to subrecumbent, silky white hair which becomes dense at sides, with medium-sized punctures moderately spaced at middle, becoming dense at sides, anterolateral punctures of first visible sternite coarser, second visible sternite more finely, densely punctate at middle than first, last visible sternite with a well-developed, broadly rounded, subapical plate. Female genitalia as in Fig. 11.

Length: 10.6 mm. Width: 3.9 mm.

TYPE MATERIAL AND LOCATION: Holotype female, Wildrose Canyon, Panamint Mountains (Range), Inyo County, California, elevation 7000 feet, June 15, 1961 (G. H. Nelson), on *Cowania stansburiana*, genitalia slide RLW 314, deposited in the California Academy of Sciences. The following paratypes from the same locality: Eleven, 7000 feet, June 15, 1961; four, 8100 feet, June 17, 1961 (GHN); 7400 feet, April 22, 1964 (RLW), dug from stem of *Ephedra viridis*; 7200 feet, April 21, 1965 (RLW, WFB, ARG), reared from *Ephedra viridis*. Twelve paratypes, Lee Canyon, Clark County, Nevada, July 1, 1966 (RLW), June 2, 1970 (JMD). Paratypes deposited in the collections of Los Angeles County Museum of Natural History, W. F. Barr, J. M. Davidson, G. H. Nelson, and the author. The following specimens are placed under this species, but are not included in the type series: Two, Benton, Mono County, California, May 27, 1954 (MAC); one, May 17, 1942 (WMP); one, Mt. Montgomery, Nevada, 7000 feet, June 21, 1942 (RMB).

DISTRIBUTION: Southeastern California and southwestern Nevada: Panamint, White, and Spring Mts.

BIONOMICS: Adults have been taken on the flowers of *Cowania mexicana* var. *stansburiana* (Torrey) Jepson and *Fallugia paradoxa*. Field and laboratory studies during 1964 and 1965 proved that the larvae bore in *Ephedra viridis*, which is usually the only species present in the Pinyon-Juniper Woodland plant community (Munz, 1963) where *A. panamintensis* occurs.

VARIATION: Specimens of *A. panamintensis* examined ranged from 8.9 to 11.1 mm in length and from 3.3 to 4.3 mm in width. The type series shows variation in the size of the elytral spots, but the arrangement is quite uniform. Their color ranges from light yellow to orangish yellow; the latter color may be due to a slight discoloration often seen in dead specimens of some species of this genus. The basal discal spots are absent in most specimens, but when present are always small. Four specimens have humeral yellow spots and three of these also show lateral yellow or brownish pronotal spots. Several of the specimens examined possess spots which almost reach the apices of the elytra. The hairs of the elytral disc are predominantly whitish in some specimens from Lee Canyon, Nevada. The ground color of some individuals exhibits slight bluish reflections. Three bluish specimens from Benton, which is about 130 miles northwest of the type locality and at an elevation of only 5600 feet, can most likely be assigned to this species.

DIAGNOSIS AND COMPARISON: This species will key to *A. pubiventris* in Fall (1899). However the relationship of *A. panamintensis* to other species is not clear. Superficially it appears to be closely related to *A. pubiventris* or *A. mojavei* and in general appearance it may resemble either of those species. However, *A. panamintensis* is less elongate and less convex. Based upon the structure of the female genitalia it is probably closer to *A. atactospilota* or *A. verityi*. *Acmaeodera panamintensis* is readily distinguished from any of the above by having dark hairs throughout the surface of the elytral disc.

The occurrence of this species at such high elevations is an interesting facet in the distribution of the group studied herein. The association of this species with *Ephedra* correlates well with other species under consideration, but this cannot be used alone to establish relationships. A specimen of an entirely unrelated group was also reared from that plant. Additional material and distributional data are needed to more fully interpret the taxonomic position of this beetle.

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